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COMPLEMENTARITY BETWEEN AGRICULTURAL AND INDUSTRIAL DEVELOPMENT

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Introduction

1. That sustained economic progress, in most low-income countries, entails a progressive reallocation of labor and capital from primary to industrial sectors, is the consensus of nearly all economists. However, this does not necessarily lead to the conclusion that agricultural development can or should be neglected in order to make more capital immediately available for industrial expansion. In most low-income countries, failure to develop production potentials in domestic agriculture impedes long-term economic development, including industrial development. Considering current population growth rates and the prospect that they may increase, the difficulty of supplying sufficient food and fiber appears as one of the greatest barriers to rising per capita incomes.

2. However, advances in science and technology have and no doubt will continue to increase the possibilities of expanding food supplies, and general economic and social development gives promise, in the long run, of restraining population growth. Various countries have already escaped from the "low-level equilibrium trap" visualized by Malthus and other classical economists. And most informed people are agreed that affluence can eventually be created for all societies if proper measures are taken. But there is not general agreement regarding the socio-economic institutions, policies and programs best suited for producing economic progress in the low-income countries (6)*. This is especially true of recommendations regarding the role of agricultural development.

Industrial Fundamentalism and Planning for Development

3. A few decades ago, it was popular to refer to the essential primacy of human needs for food and clothing as a rationale for identifying agriculture as the "fundamental" industry. This idea, carried to the extreme, implied that the one essential of economic progress and prosperity was a prosperous agriculture. More adequate analysis revealed the deficiencies of this "agricultural fundamentalism" doctrine. In more recent years, the pendulum of economic doctrine appears to have swung to the other, equally indefensible, extreme of "industrial fundamentalism" -- the idea that industrialization is the prime essential of general economic development.

4. The attractiveness of the notion that heavy industrialization is the key to affluence may be attributed to two major factors: the industrial development

*Numbers in parentheses refer to appended references.

accomplishments of the U.S.S.R., where most emphasis has been on the expansion of heavy industry; and the historical correlation between industrialization and economic development in the presently more advanced economies (12).

5. This analysis by analogy is dangerous, as the situations are not analogous and the direction of causation is confused. From the experiences of the developed countries one should not infer that progress in today's low-income countries would be facilitated by the same emphasis upon industrialization as occurred in the Soviet Union. The Russian drive to industrialize began from a higher level of per capita agricultural output than now prevails in much of the less developed world. As various writers have indicated, the Russians began with a substantial agricultural surplus (17). Thus, though harsh methods were required to repress consumption, especially among farmers, measures to increase the production of food and other consumer goods could be neglected without causing shortages sufficiently serious to prevent the rapid expansion of heavy industry. Similar "surpluses" are not available in countries such as India. Where development has occurred without strongly enforced central direction, inter-sectoral adjustments (i.e., shifts of resources from agriculture to industry) have, in large measure, resulted from rather than caused per capita income progress: rising incomes led to changes in the composition of consumer demand and resource adjustments were made to accommodate these demand changes.

6. This is not to say that inter-sectoral adjustments were not essential for continued progress. Without such adjustments, new forms of consumption would not have been introduced; sustained increases in agricultural productivity would have resulted simply in food surpluses; and stagnation would have resulted from the lack of aggregate demand (12). Furthermore, much of the increased productivity in Western agriculture -- which made the continuing transformation to industrialization possible -- resulted from the adaption of developments that occurred in other sectors, e.g., the internal-combustion engine, chemical fertilizers and insecticides, etc. Today, much of the non-agricultural activity in the developed countries is devoted to the production of intermediate producer goods for agriculture and the processing and distribution of farm commodities. Without development in these non-farm sectors, current agricultural productivity would be sharply reduced. The fact remains, however, that the initial industrialization of the developed countries was built on the firm foundation of agricultural surpluses (15).

7. Economic growth models used by planners have, in the interest of analytical simplicity, often utilized simplifying assumptions which have led to introduction of the "industrial fundamentalism" fallacy into development plans. One such common error is that which assumes the economy to be closed to international trade, and divides it into production goods and consumer goods sectors. This leads, of course, to the conclusion that the growth of national product depends completely upon the proportionate allocation of investments to production goods sectors since, by assumption, all such capital goods must be produced domestically. This leads, in turn, to the paradox which indicates that although capital is much more productive when invested in consumer goods production, it should, nonetheless, be allocated as heavily as possible to the production goods sector. Proper analysis would indicate that long-term growth would be maximized by investing in production of consumer goods -- wherein the greater comparative advantage lies for most underdeveloped countries -- and exchanging these for capital goods imports. The significance of this can be inferred from the conclusion by Professor P. C. Mahalanobis (as an example) that Indian development would be more rapid the greater the allocation of investment to the production of capital goods, in spite of his conclusion that the productivity of a given investment in consumption goods is perhaps three times as high (2).

8. Such models also tend to deflect attention from the necessity to provide

adequately for expanded consumption requirements. Then, when difficulties arise, it becomes necessary to make up deficiencies from foreign sources. This diverts resources that were originally reserved for capital formation or forces upon the current generation more than the intended degree of privation. Thus, as a framework for planning, they do not encourage consideration of the relative costs of domestic production versus imports of food and other consumer commodities, nor for the possibility of acquiring capital goods with the proceeds of consumer goods exports.

9. Given the unsettled state of world affairs, the widely shared urge for eventual self-sufficiency is understandable. But the desire for short-term self-sufficiency is another matter. Especially in their capacities for capital goods production, few of the low-income countries are presently well prepared to meet the requirements of rapid capital formation. At least in the immediate and intermediate future, growth efforts will be seriously impeded and unduly repressive of current consumption unless a major share of their producer goods requirements are imported.

10. Professor Myrdal and others have analyzed the consequences of trade between developed and less developed nations to show that over a long period unrestricted international trade would work to the disadvantage of the latter (16). In the low-income countries, competition from imports would indefinitely postpone development of industrial activities in which they could actually achieve comparative advantages, given temporary subsidies or temporary protection from foreign competition. These conclusions have led various people to propose resource allocation policies which would have the effect of by-passing shorter range opportunities to gain from existing comparative advantages.

11. Long-range potentials for developing comparative advantages in industrial production do not necessarily, however, imply that rapid growth will be fostered by currently allocating the "lion's" share of investment to those activities. The level of national product that can be achieved by some future date depends upon the level of savings and investment in the interim period. Maximization of savings-investment rates in the interim requires exploitation of existing comparative advantages, so as to maximize the excess of production over consumption needs. Through time, as development progresses, comparative advantages may gradually move toward the producer goods sector, and existing comparative advantages would come to diverge less and less from the long-term comparative advantages. But, given the present stage of development in most low-income countries, it is our judgment that in the immediate and intermediate future advantages will be found most frequently in the primary and light industry sectors instead of in heavy industry -- primarily in the production of consumer goods rather than capital goods.

Agricultural Response to Technological Advance

12. The relegation of agriculture to a position of secondary importance in development efforts is encouraged by beliefs that the soils and climate of the low income regions prohibit the achievement of high yields per acre. Thus the conclusion is reached that substantial expansion of agricultural production is not feasible, except to the extent that new lands can be brought into production. However, it is becoming increasingly clear that very modest inputs of capital in forms which serve to introduce coordinated improvement of farming methods -- of plant varieties, animal breeds, pest control, fertilization, irrigation, crop rotation -- may result in tremendous increases in yields (3). Productivity of capital in such uses is probably higher than in any other investment, particularly in labor-dense economies. Problems of obtaining and maintaining high yields in the low-income countries will probably be as amenable to scientific methods as they have been in

the developed countries. This is a point on which there is general agreement among U. S. Agricultural Economists.

13. Considerable significance has been attached to the fact that agricultural development programs have not caused large immediate increases in yields. While recognizing the many shortcomings of agricultural research and extension programs in the low-income countries and their relative ineffectiveness to date, we submit that it is too much to expect such programs to have large results immediately after their initiation. Immediate results were not obtained from such programs in the United States or elsewhere. However, such efforts should become increasingly effective as more competent personnel are obtained, operational procedures are improved, peasants become more confident in the ability of extension workers to give reliable advice, etc. Output from agricultural research and extension programs in the low-income countries will probably be cumulatively increasing in nature, just as they have been in the developed countries, particularly if adequately coordinated with effective programs of farm supply service and price support assurance. Current investments in developing these institutions may not produce maximum returns for 10-15 years or longer. But, except in rare cases, the fundamental fact of poverty in these countries cannot be changed in a shorter period in any event; and until agriculture is more productive, sustained and rapid industrial progress will be difficult.

14. In any case (quite aside from the above argument) self-sufficiency in consumption goods, especially food, might reasonably be regarded as a more urgent goal than self-sufficiency in heavy industry. Certainly, intermittent disruptions of foreign supplies of consumer goods, upon which an economy has come to depend, would cause more havoc than similar disruptions of foreign supplies of producer goods.

Agricultural Development and Economies of Scale

15. Agricultural development policy for the low-income countries revolves also about questions regarding the means of obtaining production increases from domestic agriculture -- labor intensive versus labor extensive methods and large farms versus small farms.

16. One school of thought proposes that less developed countries should not wait for a gradual formation of capital within the existing mode of organization of agriculture into small, labor-intensive farms, on which opportunities for technological advance and for expanding uses for capital are extremely limited. Rather, agriculture should, through government action, be reorganized as quickly as possible into large highly mechanized farms to make possible substitution of greater amounts of capital for labor. Admittedly, this must be accompanied by enough industrialization to absorb the displaced rural workers (7).

17. However, this line of reasoning reverses the true relationship. In any reasonably constant growth process, agriculture can be counted upon to "spare" enough workers to fill such jobs as are created by industrial expansion -- and technology to replace the jobs vacated in agriculture -- as the record of the more developed economies reveals. The problem is to utilize very limited national capital budgets in such a way as to achieve this necessary industrial expansion simultaneously with necessary increases in agricultural productivity. Heavy investments of labor replacing (as distinct from yield increasing) capital in agriculture would merely displace farm workers without necessarily increasing yields while, at the same time, diverting capital from the industrial expansion needed to absorb these displaced workers. Thus, except under special circumstances, decisions to allocate capital to the mechanization of agriculture by establishment of large scale farms

would not further economic growth. Such mechanization would merely increase unemployment without increasing output of either the farm or non-farm sector. Furthermore, it is not necessary that land-labor ratios be substantially increased for continuing increases in agricultural output to be obtained. Nor does labor replacing mechanization necessarily have any significant influence upon total farm output (9).

18. Japanese development supports this view. Mr. Toshio Shishido has presented data regarding changes in Japanese agriculture from 1878-82 to 1938-42. According to his estimates, with a relatively stable farm labor force (decline of 2-3 percent) and a moderate increase in land area cultivated (about 29 percent), the index of agricultural output increased from 33.1 to 121.3 (22). This large increase in output per acre and per worker was accomplished within the framework of very small individually operated farms. The types of capital introduced were such that, except over a very long period, the land-man ratio was not significantly increased.

19. Other relevant evidence too extensive for review in this paper supports this conclusion. One of the present writers noted in an extensive analysis of Indian data "a general inverse relationship between sizes of farm and value of output per acre."(13).

20. Many people, for instance Professor P. N. Driver, have argued that large operating units (cultivating cooperatives) using (initially) labor intensive methods are needed for high yields per acre and low per unit costs in agricultural production (4). Here, it should be noted that where peasant agriculture exists it is common to find a marked degree of inter-farm cooperation in the sharing of work-stock, machines and labor, and that available evidence does not indicate that costs per unit of output are lower on the larger than on the smaller farms, especially where agriculture is characterized by excess labor (4). Available evidence from the experience of Yugoslavia (1,20) U.S.S.R.(23) Israel (20,14) and, inferentially, India and the United States (13,14) runs, from an economic point of view, strongly against the formal cultivating cooperative or collective farm.

21. It seems especially inappropriate to argue, as Mr. Driver and others have, that the potential economies are so great as to warrant coercion in the establishment of such farms. It seems important to note that compulsion, like most other things, is subject to diminishing returns. Though we realize that increased farm output was not the primary objective, forced collectivization of agriculture in the U.S.S.R. does not appear to have had a favorable effect upon farm production. To quote Professor W. H. Nicholls:

> ". . . by 1938, the average collective farm still provided only 15 acres of sown acreage per peasant family and average annual grain production (on 10 percent more acreage) for 1934-38, according to the most recently revised estimates, approximated no more than the levels of 1925-28 or even 1913." (18).

22. In many situations, more cooperation among rural people could no doubt reduce costs and increase effectiveness. But values for individually owned and operated farms are strongly held by peasants of most low-income countries; forced cooperation is not willingly accepted (1,20,23). Furthermore (in addition to weakening incentives to individual effort) it normally results in less cooperation by reducing the "quality" of efforts by the people. Since, further, there appears to be no inherent economy in magnitude of operation, "coerced cooperation" can be expected to reduce output. The Japanese experience indicates that rapid technological progress can be made within the framework of small, family farms -- and also that with appropriate policies of farm taxation, surplus production from such

farms can be made available for workers in rapidly expanding industrial or export sectors without allowing the major benefits of increased farm production to accrue to the cultivating population. This was the primary objective that led to the collectivization of agriculture in the U.S.S.R.

Industrial-Urban Development and Population Growth

23. In part, the tendency of economic planners to accept industrial fundamentalism as a theory of economic progress results from beliefs regarding the influence of an industrial-urban environment upon population growth rates. They assume that, until a large share of society becomes urbanized, traditional attitudes toward marriage and reproduction will not change. This is of obvious significance as investments in economic growth must, at least in a crude sense, come from the margin between increased national productivity and increased consumption -- to which population growth is a major contributor. Various writers have proposed that attitudes permissive of low birth rates are the automatic result of industrialization, and that, until the low-income countries can become industrialized, lower birth rates cannot be obtained (8). These propositions lead to the conclusion that all-out efforts to industrialize provide the only real hope of obtaining per capita incomes substantially above current levels, because, under a gradual rural-urban transformation, population growth would indefinitely overwhelm prospective increases in total production.

24. Certain of the low-income countries are currently demonstrating annual population growth rates in excess of three percent. Unless larger foreign capital flows can be obtained, the capital budgets of many countries will be inadequate to insure rates of growth in total output in excess of population growth rates. If industrial-urban growth would eventually result in population control, and if low birth rates could not be obtained in other ways, development could presumably not occur without a "great leap" to urbanization.

25. But available evidence does not indicate that rapid industrial-urban development would cause a substantial reduction in population growth rates in less than one or two generations. Indications are that a more direct approach will be required if population growth rates are to be substantially reduced in less time (19). In general, urban populations have lower birth rates than do rural populations. But this does not prove that persons moved from a rural to an urban setting will accept the behavior patterns of long-time urbanites. Historically, the decline in birth rates in developed countries did not occur until long after substantial urbanization had taken place. The recent Japanese experience, where the birth rate fell from 34.3 in 1947 to 18.5 in 1956, is relevant (11). Japan was substantially industrialized when this occurred. However, it does not appear to have been the automatic result of urbanization. A very direct and intensive effort was required to reduce the birth rate, and there is no reason to believe that urbanization was essential for the success of that effort.

26. To our knowledge, the most adequate evidence from the United States has been presented by Professor David Goldberg and concerns the fertility behavior of persons living in Detroit and Indianapolis. He shows that farm migrants to these cities did not accept the "urban" values favoring small families, for at least a generation or more. Furthermore, size of family was associated with the socio-economic level, rather than the mere fact of farm origin (5). Most studies point to one fact of outstanding importance: the fertility rates of farm migrants living in cities, and of farm people themselves, reflect primarily differences in educational levels. Educated farm people -- and educated farm migrants living in cities -- have smaller than average families; i.e., their fertility behavior resembles that of long-time urbanites (10). All this suggests that education and

other general factors of economic and social progress, rather than industrialization or urbanization as such, are the primary determinants of population growth.

27. In the rural areas of less developed countries, most people have had little education and illiteracy rates are high. Urban people are generally better educated than are rural people, but changing the setting from rural to urban will not automatically increase the level of education. Education levels will not rise until resources are allocated for that purpose. Traditionally, rural people, especially farmers, have been uneducated. Thus, the tendency is to regard education for rural people as less essential for economic progress. This is one of the most tragic of misconceptions. As Professor Schultz has indicated, from a review of the agricultural development experiences of several countries:

> "Those countries that have the best records have not won them because they have the best land, or mainly because they have increased rapidly the reproducible capital in agriculture, but largely because they have acquired the skills and knowledge required, and a confidence in their ability to develop a modern agriculture." (21).

Japan has emphasized the development of a well educated population for generations. Today, less than five percent of her adult people are illiterate. Both the reduction in population growth rates and the economic development of agriculture seem largely attributable to this fact.

28. The allocation of sufficient resources to assure adequate educational progress among rural people and to establish a framework of institutions dedicated to adapting technological developments to the advancing of family farms is perhaps the most important single key to economic development of most less developed, primarily agrarian countries.

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